An effort will be made to survey all transect areas during the same low tide event to account for all birds in the area. Observations along Transect Areas 1 and 3 may be conducted during either low or high tide events, however observations along Transect Area Nos. 2 and 4 should be collected during low tide events to account for habitat usage along the mid-inlet shoal.

Due to accessibility and safety issues, bird monitoring along the mid-inlet shoal of Transect Area No. 2 will be conducted from a boat with the use of binoculars. Bird monitoring surveys will not be conducted during inclement weather (i.e., heavy rain) or when winds speeds are excessive.

Based on previous observations made by the NCWRC, they suggest that the north side of Transect Area No. 1 and Island No. 2 are focused on during bird monitoring events, since these areas have historically been frequented by piping plovers and other shorebirds.

4. REPORT PREPARATION: A quarterly report of the observations made along Transect Nos. 1-4 will be prepared and submitted to the USACE. An annual report summarizing the previous year's data will be prepared and submitted on May 30th of every year (through April 1st of the reporting year).

The NCWRC has anecdotal bird data of the Bogue Inlet area from 1985. Data obtained by the NCWRC from 1997 to the time of report preparation will be used for historic comparisons of species presence/absence and habitat use.

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TOWN OF EMERALD ISLE, NORTH CAROLINA
BOGUE INLET CHANNEL RELOCATION PROJECT

SALTMARSH MONITORING PROGRAM

Prepared For:
Town of Emerald Isle, North Carolina

Submitted To:
U.S. Army Corps of Engineers
Wilmington, North Carolina

Prepared By:
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Wilmington, North Carolina

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TOWN OF EMERALD ISLE
BOGUE INLET CHANNEL RELOCATION PROJECT

SALTMARSH MONITORING PLAN

1. PURPOSE AND GOALS: The following sampling and monitoring plan has been developed in support of an Environmental Impact Statement for the Bogue Inlet Channel Relocation Project. The monitoring plan is intended to address the need for data collection and analysis of the adjacent saltmarsh communities in the vicinity of the project area.

The monitoring plan will provide information on coastal marsh habitats that may be directly or indirectly affected by the channel relocation efforts. This plan is intended to support the concerns of the U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife Service, National Marine Fisheries Service, the North Carolina Department of Environment and Natural Resources, the North Carolina Division of Marine Fisheries, and the North Carolina Wildlife Resource Commission.

Monitoring efforts are proposed to assess and document the potential effects of perturbations, such as sedimentation on adjacent saltmarshes. Sampling efforts will concentrate on representative areas of potential impact where biota and physical conditions may be affected by project activities and related effects.

2. MONITORING SCHEDULE: A total of four monitoring events will be conducted to determine if impacts are directly or indirectly attributable to project activities. The effects of perturbation on vegetative conditions will be most pronounced during active growth and development periods. Therefore, observations of these effects will be better identified at the end of the growing season (September/October). Pre-construction monitoring to collect baseline conditions will be conducted at the end of the growing season in either September or October 2003. Annual saltmarsh monitoring will continue for three-years post-construction.

The proposed project will be constructed between November 16th and March 31st to limit construction activities during the critical life stages of birds and fish, the turtle nesting and hatching season, the migratory passage of marine mammals, and the flowering stages of plants.

3. BIOLOGICAL MONITORING PARAMETERS:

3.1 SALTMARSH AND ECOLOGICAL MONITORING

Monitoring of the selected parameters identified below, along with the infaunal characterization will document and assess the potential effects of project activities on primary productivity in the saltmarsh habitat.

3.1.1 Monitoring Stations

Saltmarsh monitoring transects will be located at the following locations: 1) north of Bogue Inlet on the east side of the main channel, 2) on the east side of Dudley Island, and 3) north of Bear Island. Refer to Figure 1 for the saltmarsh monitoring stations.

3.1.2 Monitoring Parameters

The following monitoring parameters are based on the potential for indirect impacts to the adjacent salt marsh communities from the channel relocation efforts. Monitoring stations will include control stations of similar vegetation and tidal habitat. The monitoring parameters include:

- *Spartina* sp. stem density,
- Mature (>30 cm in height) *Spartina* sp. stem height,
- Percent sand, silt, and clay of surface substrate,
- Percent organic content of surface substrate,
- Sedimentation rate,
- Wildlife utilization, and
- Channel marsh edge erosion.

3.1.3 Methodology

Three permanent 300 foot monitoring transects will be located in the saltmarsh areas in the vicinity of the project. Five one-meter square quadrats for each transect (located 5, 50, 100, 150, and 300 feet away from the marsh edge) will be sampled for stem density and height of *Spartina*. The transect located on the north side of Bear Island will serve as the relative control site for the other transects. This transect is not expected to exhibit project-related impacts.

Sediments will be characterized based on percent sand/silt/clay and percent organic content. Samples will be collected from the 5, 50, 100, 150 and 300-foot locations along each transect. In addition, graduated PVC piping will be installed prior to project construction to evaluate sediment deposition and/or erosion over time for each plot. The PVC will be exposed 3 to 4 feet above the existing sediment line to account for high sediment accretion rates.

Direct visual observations and indirect evidence will be used to document the presence of epibenthic macroinvertebrates and wildlife along the transect corridors. Each transect corridor will extend 150 feet from the edge of the marsh, roughly perpendicular to the channel, and will be three feet wide. Separate control transect corridors (150 feet by 3 feet) will be established parallel to the channel and intersect the 150-foot quadrat locations.

3.1.3 Organic Content Samples

One substrate sample per quadrat location will be collected to determine the organic content of the sediments. Samples will be collected to a depth of 15cm